Quarterly Report

Covering July 1, 2005 to September 30, 2005

Submitted September 30, 2005

Project Title

Warm Water Species Fish Passage in Eastern Montana Culverts

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Introduction

This progress report covers work completed between July 1, 2005 and September 30, 2005. Work on the project during this period has been primarily devoted to collection of field data.

Project Objective

Culverts are a common and often the most cost effective means of providing transportation intersections with naturally occurring streams or rivers. Fish passage and fish habitat considerations are now typical components of the planning and design of waterway crossings. Many culverts in Montana span streams that support diverse fisheries. The health of these fisheries is an essential element of a recreational industry that draws hundreds of thousands of visitors to Montana annually. Additionally, there is growing recognition of the value of native Montana species, some of which are considered 'species of special concern' in the state. In recent years these concerns have become apparent for warm water species in low gradient, high sediment bearing, intermittently flowing streams that are typical of eastern Montana.

Transportation system planners, designers and managers recognize that fish passage through Montana's culverts is a concern. However, there is much contention concerning the impact that a culvert can have on a fishery. Recent basin-wide studies of various trout species that we conducted in western Montana indicate that the tools that some planners and designers promote for forecasting fish passage concerns may be overly conservative. Which species, life stages, and how many individuals must have fish passage access for how long, are questions that are often brought forward during discussions on the design and retrofitting of culverts to accommodate fish passage concerns. ***The problem is that for warm water fish species and settings in eastern Montana, the timing and number of fish that must pass a culvert to maintain viable species diversity in the watershed is unknown, and the physiologic abilities of these species relative to such common fish passage questions are often unknown.***

Progress

Field data collection continued throughout the summer, including the collection of surveying and hydrologic data. Traditional land surveying techniques were used with the total station in proximity of each culvert of interest to develop HEC-RAS quality information. Tru-track data loggers were used to record stage, and a Pygmy velocimeter was used to estimate flow rate for correlation with stage. This will allow superimposition of flow data on fish passage success data.

Fish mobility data was collected at the sites. At some sites fish population samples were collected upstream and downstream of the culvert in 300 m long reaches. In each reach fish were measured and cataloged by species, sex and fork length. These streams tend to have a high fish species and size diversity. Fish were collected using in-stream seines, as shown in Figure 1.

At other sites, the direct assessment of fish passage was measured by marking, releasing and re-capturing fish at locations upstream of the culvert and in a control reach without a culvert. The recapture efficiencies overall were low due to the open-ended reaches (these streams tend to be too large to block with a net), but some fish of several species were observed passing the culverts and the control reaches none-the-less.

Instruments sensitive to freezing have been monumented and removed from the field sites, and data analysis for the hydraulic, hydrologic and fish mobility data is just now beginning.

Figure 1. Seining fish for population samples.

Budget

Expenditures for this cycle are largely a result of stipends and travel to and from the research site.